



DEFENSE INFORMATION SYSTEMS AGENCY

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IN REPLY
REFER TO: Joint Interoperability Test Command (JTE)

16 Dec 11

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Special Interoperability Test Certification of the Avaya Ethernet Routing Switch (ERS)8600 with Release 7.1.0.100_B068

References: (a) DoD Directive 4630.05, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 5 May 2004
(b) CJCSI 6212.01E, "Interoperability and Supportability of Information Technology and National Security Systems," 15 December 2008
(c) through (e), see Enclosure 1

1. References (a) and (b) establish the Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification.
2. The Avaya ERS8600 with Release 7.1.0.100_B068 is hereinafter referred to as the System Under Test (SUT). The SUT meets all of its critical interoperability requirements and is certified for joint use within the Defense Information System Network (DISN) as an Assured Services Local Area Network (ASLAN) Core, Distribution, and Layer 2/Layer 3 Access switch. The SUT is certified as interoperable for joint use with other ASLAN components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 1000 Base-SX, 1000Base-LX, 100Base-FX, 10Gbase-SR, 10Gbase-LR, 10/100/1000BaseT. JITC tested all these interfaces with the exception of the 10BaseT and 100Base-FX interfaces. The JITC analysis determined the 10BaseT and 100Base-FX interfaces is low risk for certification based on the vendor's Letter of Compliance (LoC) to comply with the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.3i and 802.3u standards and the testing data collected at all other data rates. The SUT meets the critical interoperability requirements set forth in Reference (c), using test procedures derived from Reference (d).

The SUT is certified to support Assured Services within an ASLAN. If a component meets the minimum requirements for deployment in an ASLAN, it also meets the lesser requirements for deployment in a non-ASLAN. Non-ASLANs are "commercial grade" and provide support to Command and Control (C2) (ROUTINE only calls) (C2(R)) or non-C2 voice subscribers. When deployed in a non-ASLAN, the SUT may also be used to receive all levels of precedence, but is limited to supporting calls that are originated at ROUTINE precedence only. Non-ASLANs do not meet the availability or redundancy requirements for C2 or Special C2 users and therefore are not authorized to support precedence calls originated above ROUTINE.

No other configurations, features, or functions, except those cited within this document, are certified by JITC. This certification expires upon changes that could affect interoperability, but

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no later than three years from the date the Defense Information Systems Agency (DISA) Certifying Authority (CA) provided a positive recommendation.

3. This finding is based on interoperability testing conducted by JITC, review of the vendor's LoC, and DISA CA Recommendation. Interoperability testing was conducted by JITC, Fort Huachuca, Arizona, from 3 August through 28 September 2011. Review of the vendor's LoC was completed on 15 August 2011. DISA adjudication of open test discrepancy reports was completed on 30 November 2011. Verification & Validation (V&V) testing was conducted from 5 through 9 December 2011 to fix open test discrepancies. The DISA CA provided a positive Recommendation on 13 December 2011 based on the security testing completed by DISA-led Information Assurance (IA) test teams and published in a separate report, Reference (e). Enclosure 2 documents the test results and describes the tested network and system configurations.

4. Table 1 provides a UC APL product summary. Table 2 provides the SUT interface interoperability status and Table 3 provides the Capability Requirements (CR) and Functional Requirements (FR) status. The threshold CR/FRs for ASLAN components are established by Section 5.3.a of Reference (c) and were used to evaluate the interoperability of the SUT.

Table 1. UC APL Product Summary

| Component ¹ | Release | Sub-Component | Certification Applicability | | |
|------------------------|----------------|-------------------------|-----------------------------|--------------|--------|
| | | | Core | Distribution | Access |
| Avaya ERS8600 | 7.1.0.100_B068 | 8692SF | Yes | Yes | Yes |
| | | 8648GBRS | | | |
| | | 8648GTRS | | | |
| | | 8612XLRS-J ¹ | | | |
| | | 8612XLRS ² | | | |
| | | 8634XGRS ³ | | | |
| | | 8895SF | | | |
| | | 8848GB | | | |
| | | 8848GT | | | |
| | | 8005DC | | | |
| | | 8005AC | | | |
| | | 8010 | | | |
| | | 8010CO ⁴ | | | |
| | | 8006 | | | |

NOTES:

1. This module offers 12-10G Ethernet ports; however, to meet the Core and Distribution layers 50% non-blocking requirement it is certified with only 6 ports (odd ports only), restricted in software, and with a vendor fabricated face plate exposing only the odd ports. Furthermore, to meet the one-to-one failover requirement with this module the SUT requires dual processors/switch fabrics per 8600 chassis and two chassis at the Core or Distribution layers.

2. This module fails to meet the Core and Distribution layers 50% non-blocking requirement but meets the Access layers 12.5% non-blocking requirement. Therefore, it is certified as an access interface only.

3. The 10G ports on this module, when configured as a SMLT IST interface, experienced excessive packet loss. Therefore, when configured in a homogeneous network the 10G ports on this module are certified as access interfaces only.

4. This chassis was not tested however, JITC determined that it is similar to the 8010 chassis for certification purposes and it is also certified for joint use.

LEGEND:

| | | | |
|------|---|------|-------------------------------------|
| APL | Approved Products List | IST | Interswitch Trunk |
| ASIC | Application-Specific Integrated Circuit | JITC | Joint Interoperability Test Command |
| G | Gig | SMLT | Split Multi-Link Trunk |
| Gbps | Gigabit per second | UC | Unified Capabilities |

Table 2. SUT Interface Interoperability Status

| Interface | Applicability | | | UCR 2008, Change 2 Reference | Threshold CR/FR ¹ | Status | Remarks |
|--|---------------|---|----------------|------------------------------------|---------------------------------|-------------------------|--|
| | Co | D | A | | | | |
| 10Base-X | C | C | C ² | 5.3.1.3.1 | 1-6 | Met ³ | SUT met CRs and FRs with the following IEEE Standard: 802.3i (10BaseT) |
| 100Base-X | R | R | C ² | 5.3.1.3.1 | 1-6 | Met | SUT met CRs and FRs with the following IEEE Standard: 802.3u (100Base-FX, 100BaseT) |
| 1000Base-X | R | R | C ² | 5.3.1.3.1 | 1-6 | Met | SUT met CR and FRs with the following IEEE Standards: 802.3ab (1000BaseT), 802.3z (1000Base-SX, 1000Base-LX) |
| 10000Base-X | C | C | C | 5.3.1.3.1 | 1-6 | Met | SUT met CRs and FRs with the following IEEE Standard: 802.3ae (10GBase-SR, 10GBase-LR) |
| 802.11a | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.11b | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.11g | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.11n | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.16 | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| NOTES: 1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 3. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3. 2. Core and Distribution products must minimally support 100Base-X (802.3u) and 1000Base-X (802.3z). Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseT/F), 802.3z (1000BaseF), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces. 3. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's LoC to comply with IEEE 802.3i standard and the testing data collected at all other data rates. 4. The SUT does not support this interface. This interface is not required for a Core, distribution, or access switch. | | | | | | | |
| LEGEND: A Access C Conditional Co Core CR Capability Requirement D Distribution FR Functional Requirement ID Identification IEEE Institute Of Electrical And Electronics Engineers, Inc. JITC Joint Interoperability Test Command LoC Letter of Compliance R Required SUT System Under Test UCR Unified Capabilities Requirements | | | | | | | |

Table 3. SUT CRs and FR Status

| CR/FR ID | Capability/Function | Applicability ¹ | UCR Reference | Status | Remarks |
|----------|---------------------------------------|----------------------------|---------------|----------------------------|--|
| 1 | General Performance Parameters | | | | |
| | Performance Parameters | Required | 5.3.1.3 | Met | |
| | Port Interface Rates | Required | 5.3.1.3.1 | Met | |
| | Port Parameter Requirements | Required | 5.3.1.3.2 | Met | |
| | Class of Service Markings | Required | 5.3.1.3.3 | Partially Met ² | |
| | VLAN Capabilities | Required | 5.3.1.3.4 | Met | |
| | Protocols | Required | 5.3.1.3.5 | Met | |
| | QoS Features | Required | 5.3.1.3.6 | Met | |
| | Network Monitoring | Required | 5.3.1.3.7 | Met | |
| | Security | Required | 5.3.1.3.8 | Met ³ | |
| 2 | E2E Performance Requirements | | | | |
| | Voice Services | Required | 5.3.1.4.1 | Met ⁴ | |
| | Video services | Required | 5.3.1.4.2 | Met ⁴ | |
| | Data services | Required | 5.3.1.4.3 | Met ⁴ | |
| 3 | NM Requirements | | | | |
| | Configuration Control | Required | 5.3.1.6.1 | Met | |
| | Operational Changes | Required | 5.3.1.6.2 | Met | |
| | Performance Monitoring | Required | 5.3.1.6.3 | Met | |
| | Alarms | Required | 5.3.1.6.4 | Met | |
| | Reporting | Required | 5.3.1.6.5 | Met | |
| 4 | Engineering Requirements | | | | |
| | Physical Media | Required | 5.3.1.7.1 | Met ⁵ | |
| | Traffic Engineering | Required | 5.3.1.7.3 | Met ⁵ | Configured with four queues, each set to 25% of total bandwidth. |
| | Availability | Required | 5.3.1.7.6 | Met | 100% availability during test. |
| | Redundancy | Required | 5.3.1.7.7 | Met | |
| 5 | MPLS | | | | |
| | MPLS Requirements | Conditional | 5.3.1.8.4.1 | Not Tested ⁶ | |
| | MPLS VPN Augmentation to VLANs | Conditional | 5.3.1.8.4.2 | Not Tested ⁶ | |
| 6 | IPv6 Requirements | | | | |
| | Product Requirements | Required | 5.3.5.4 | Partially Met ⁷ | |

Table 3. SUT CRs and FR Status (continued)


| | | | |
|---|---|--------|------------------------------------|
| NOTES: | | | |
| 1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The system under test does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements. | | | |
| 2. Met all requirements with the following exception: The SUT is unable to reassign any DSCP IPv6 marking. This discrepancy was adjudicated by DISA on 30 November 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix with the next software release in December 2013. | | | |
| 3. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. Detailed IA requirements are included in Reference (e). | | | |
| 4. This requirement was verified and met using simulated voice, video, and data traffic in an operational emulated environment to meet E2E requirements. The SUT must be deployed in accordance with deployment guide and engineering guidelines provided in UCR Change 2, paragraph 5.3.1.4. | | | |
| 5. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Section 11.2 d. of Enclosure 2 and that does not create a single point of failure which could impact more than 96 C2 users. | | | |
| 6. MPLS was not tested and is not certified for joint use. MPLS is conditional and; therefore, not required for a Core, Distribution, or Access switch. | | | |
| 7. The SUT met the IPv6 requirements with the following exception: The SUT did not meet RFCs 4007 and 4552. This discrepancy was adjudicated by DISA on 30 November 2011 as having a minor operational impact with vendor's POA&M to fix by 1 April 2012. | | | |
| LEGEND: | | | |
| CR | Capability Requirement | MPLS | Multiprotocol Label Switching |
| DISA | Defense Information Systems Agency | NM | Network Management |
| DISR | Department of Defense Information Technology Standards Registry | OSPFv3 | Open Shortest Path First version 3 |
| DSCP | Differentiated Services Code Point | POA&M | Plan of Action and Milestones |
| E2E | End-to-End | QoS | Quality of Service |
| FR | Functional Requirement | RFC | Request For Comment |
| IA | Information Assurance | SUT | System Under Test |
| ID | Identification | UCR | Unified Capabilities Requirements |
| IPv6 | Internet Protocol version 6 | VLAN | Virtual Local Area Network |
| LoC | Letter of Compliance | VPN | Virtual Private Network |

5. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>. All associated data is available on the Defense Information Systems Agency Unified Capability Coordination Office (UCCO) website located at <http://www.disa.mil/ucco/>.

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6. The JITC point of contact is Capt. Stephane Arsenault, DSN 879-5269, commercial (520) 538-5269, FAX DSN 879-4347, or e-mail to Stephane.Arsenault@disa.mil. The JITC's mailing address is P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The Tracking Number for the SUT is 1108901.

FOR THE COMMANDER:


for BRADLEY A. CLARK
Chief
Battlespace Communications Portfolio

3 Enclosures a/s

Distribution (electronic mail):

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Defense Information Systems Agency, TEMC

Office of Assistant Secretary of Defense (NII)/DoD CIO

U.S. Joint Forces Command, Net-Centric Integration, Communication, and Capabilities
Division, J68

ADDITIONAL REFERENCES

- (c) Office of the Assistant Secretary of Defense, "Department of Defense Unified Capabilities Requirements 2008, Change 2," 31 December 2010
- (d) Joint Interoperability Test Command, "ASLAN Component Test Plan (UCTP)," November 2010
- (e) Joint Interoperability Test Command, "Information Assurance (IA) Assessment of Avaya Ethernet Routing Switch (ERS) 8600 Series 7.1.0.100 (Tracking Number 1108901),"

CERTIFICATION TESTING SUMMARY

1. SYSTEM TITLE. The Avaya Ethernet Routing Switch (ERS) 8600 with Release 7.1.0.100_B068; hereinafter referred to as the System Under Test (SUT).

2. SPONSOR. Headquarters United States Army Information Systems Engineering Command (HQUSAISEC).

3. SYSTEM POC. Mr. Jordan Silk, ELIE-ISE-TI, Building 53302, Fort Huachuca, Arizona, 85613-5300, telephone: (520) 533-7218, e-mail: jordan.silk@us.army.mil.

4. TESTER. Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona.

5. SYSTEM DESCRIPTION. The SUT is used to transport voice signaling and media as part of an overall Voice over Internet Protocol (VoIP) system. The SUT provides availability, security, and Quality of Service (QoS) to meet the operational requirements of the network and Assured Services for the Warfighter. The SUT is a 10 or 6 slot chassis switch that will accept a variety of connectivity, management and application modules. The SUT is certified for joint use as an Assured Services Local Area Network (ASLAN) Core, Distribution, and Layer 2/Layer 3 Access switch and is interoperable for joint use with other ASLAN components listed on the Unified Capabilities (UC) Approved Products List (APL) with the following interfaces: 1000 Base-SX, 1000Base-LX, 100Base-FX, 10Gbase-SR, 10Gbase-LR, 10/100/1000BaseT. JITC tested all these interfaces with the exception of the 10BaseT and 100Base-FX interfaces. The JITC analysis determined the 10BaseT and 100Base-FX interfaces is low risk for certification based on the vendor's Letter of Compliance (LoC) to comply with the Institute of Electrical and Electronics Engineers, Inc. (IEEE) 802.3i and 802.3u standards and the testing data collected at all other data rates.

6. OPERATIONAL ARCHITECTURE. Figure 2-1 depicts an ASLAN notional operational architecture that the SUT may be used in. The SUT is certified to support Assured Services within an ASLAN. If a component meets the minimum requirements for deployment in an ASLAN, it also meets the lesser requirements for deployment in a non-ASLAN. Non-ASLANs are "commercial grade" and provide support to Command and Control (C2) (ROUTINE only calls) (C2(R)) or non-C2 voice subscribers. When deployed in a non-ASLAN, the SUT may also be used to receive all levels of precedence, but is limited to supporting calls that are originated at ROUTINE precedence only. Non-ASLANs do not meet the availability or redundancy requirements for C2 or Special C2 users and; therefore, are not authorized to support precedence calls originated above ROUTINE.

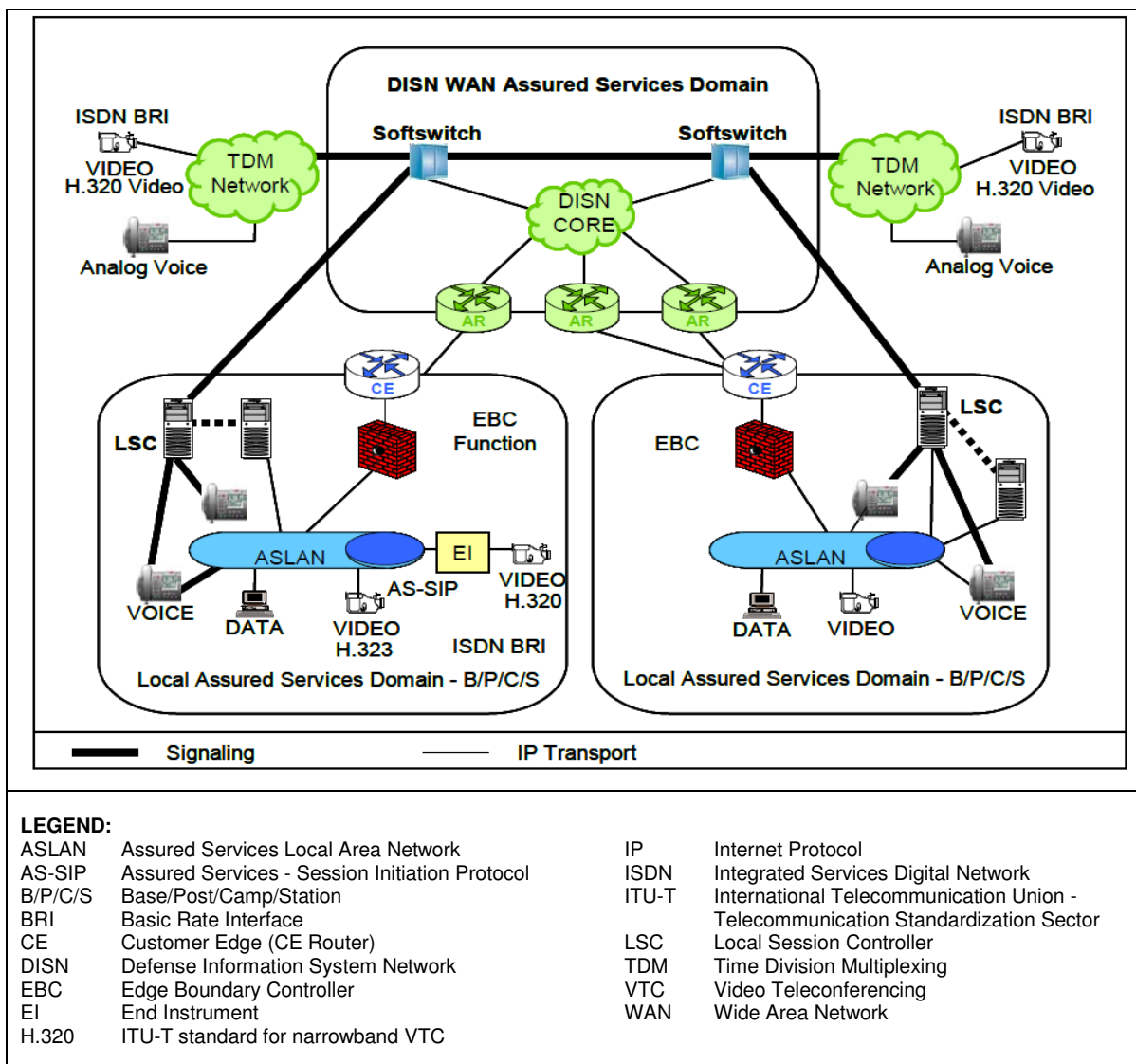


Figure 2-1. ASLAN Notional Operational Architecture

7. INTEROPERABILITY REQUIREMENTS. The interface, Capability Requirements (CR) and Functional Requirements (FR), Information Assurance (IA), and other requirements for ASLAN infrastructure products are established by Section 5.3.1 of Reference (c).

7.1 Interfaces. Table 2-1 depicts the physical ASLAN Product interfaces and the associated standards.

Table 2-1. ASLAN Products Interface Requirements

| Interface | UCR Ref | Criteria ¹ | Applicability | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------------|--|--|---|---|---|--------|----|------------------------|-------|-------------------------------------|----|----------------|---|-------------|------|--|----|------|---|----------|----|------------------------|-----|-------------------|---|--------------|-----|-----------------------------------|
| | | | Co | D | A | | | | | | | | | | | | | | | | | | | | | | | | |
| 10Base-X ² | 5.3.1.3.1 | Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3i or 802.3j | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 100Base-X ² | 5.3.1.3.1 | Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3.u | R | R | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000Base-X ² | 5.3.1.3.1 | Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.3z, or 802.3ab. | R | R | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 10000Base-X ² | 5.3.1.3.1 | Support minimum threshold CRs/FRs 1-6 and meet interface criteria for IEEE 802.ae | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 802.11a | 5.3.1.3.1 and 5.3.1.7.2 | 1-6 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 802.11b | 5.3.1.3.1 and 5.3.1.7.2 | 1-6 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 802.11g | 5.3.1.3.1 and 5.3.1.7.2 | 1-6 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 802.11n | 5.3.1.3.1 and 5.3.1.7.2 | 1-6 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 802.16 | 5.3.1.3.1 and 5.3.1.7.2 | 1-6 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | |
| NOTES: 1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 2-2. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3. 2. Core and Distribution products must minimally support 100Base-X (802.3u) and 1000Base-X (802.3z). Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseTX/FX), 802.3z (1000BaseX), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LEGEND: <table><tr><td>A</td><td>Access</td><td>FR</td><td>Functional Requirement</td></tr><tr><td>ASLAN</td><td>Assured Services Local Area Network</td><td>ID</td><td>Identification</td></tr><tr><td>C</td><td>Conditional</td><td>IEEE</td><td>Institute of Electrical and Electronic Engineers, Inc.</td></tr><tr><td>Co</td><td>Core</td><td>R</td><td>Required</td></tr><tr><td>CR</td><td>Capability Requirement</td><td>SUT</td><td>System Under Test</td></tr><tr><td>D</td><td>Distribution</td><td>UCR</td><td>Unified Capabilities Requirements</td></tr></table> | | | | | | A | Access | FR | Functional Requirement | ASLAN | Assured Services Local Area Network | ID | Identification | C | Conditional | IEEE | Institute of Electrical and Electronic Engineers, Inc. | Co | Core | R | Required | CR | Capability Requirement | SUT | System Under Test | D | Distribution | UCR | Unified Capabilities Requirements |
| A | Access | FR | Functional Requirement | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ASLAN | Assured Services Local Area Network | ID | Identification | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | Conditional | IEEE | Institute of Electrical and Electronic Engineers, Inc. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Co | Core | R | Required | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CR | Capability Requirement | SUT | System Under Test | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | Distribution | UCR | Unified Capabilities Requirements | | | | | | | | | | | | | | | | | | | | | | | | | | |

7.2 CR and FR. Switches have required and conditional features and capabilities that are established by Section 5.3.1 of the Unified Capabilities Requirements (UCR). The SUT does not need to provide non-critical (conditional) requirements. If they are provided, they must function according to the specified requirements. The SUTs features and capabilities and its aggregated requirements in accordance with (IAW) the ASLAN requirements are listed in Table 2-2. Detailed CR/FR requirements are provided in Table 3-1 of Enclosure 3.

Table 2-2. ASLAN CRs and FRs

| CR/FR ID | Capability/Function | Applicability ¹ | UCR Reference | Remarks |
|----------|---------------------------------------|----------------------------|------------------------|------------------------------|
| 1 | General Performance Parameters | | | |
| | Performance Parameters | Required | 5.3.1.3 | |
| | Port Interface Rates | Required | 5.3.1.3.1 | |
| | Port Parameter Requirements | Required | 5.3.1.3.2 | |
| | Class of Service Markings | Required | 5.3.1.3.3 | |
| | VLAN Capabilities | Required | 5.3.1.3.4 | |
| | Protocols | Required | 5.3.1.3.5 | |
| | QoS Features | Required | 5.3.1.3.6 | |
| | Network Monitoring | Required | 5.3.1.3.7 | |
| | Security | Required | 5.3.1.3.8 ² | |
| 2 | E2E Performance Requirements | | | |
| | Voice Services | Required | 5.3.1.4.1 | |
| | Video services | Required | 5.3.1.4.2 | |
| | Data services | Required | 5.3.1.4.3 | |
| 3 | NM Requirements | | | |
| | Configuration Control | Required | 5.3.1.6.1 | |
| | Operational Changes | Required | 5.3.1.6.2 | |
| | Performance Monitoring | Required | 5.3.1.6.3 | |
| | Alarms | Required | 5.3.1.6.4 | |
| | Reporting | Required | 5.3.1.6.5 | |
| 4 | Engineering Requirements | | | |
| | Physical Media | Required | 5.3.1.7.1 | Site requirement |
| | Traffic Engineering | Required | 5.3.1.7.3 | Site requirement |
| | Availability | Required | 5.3.1.7.6 | Partially driven by topology |
| | Redundancy | Required | 5.3.1.7.7 | |
| 5 | MPLS | | | |
| | MPLS Requirements | Conditional | 5.3.1.8.4.1 | |
| | MPLS VPN Augmentation to VLANs | Conditional | 5.3.1.8.4.2 | |
| 6 | IPv6 Requirements | | | |
| | Product Requirements | Required | 5.3.5.4 | |

Table 2-2. ASLAN CRs and FRs (continued)

| | | | |
|---|-------------------------------|------|-----------------------------------|
| NOTES: | | | |
| 1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The SUT does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements. | | | |
| 2. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. Detailed IA requirements are included in Reference (e). | | | |
| LEGEND: | | | |
| CR | Capability Requirement | NM | Network Management |
| E2E | End-to-End | QoS | Quality of Service |
| FR | Functional Requirement | SUT | System Under Test |
| IA | Information Assurance | UCR | Unified Capabilities Requirements |
| ID | Identification | VLAN | Virtual Local Area Network |
| IPv6 | Internet Protocol version 6 | VPN | Virtual Private Network |
| MPLS | Multiprotocol Label Switching | | |

7.3 Information Assurance (IA). Table 2-3 details the IA requirements applicable to the ASLAN products.

Table 2-3. ASLAN Products IA Requirements

| Requirement | Applicability (See note.) | UCR Reference | Criteria |
|---|-------------------------------------|------------------|---|
| General Requirements | Required | 5.4.6.2 | Detailed requirements and associated criteria for ASLAN products are listed in Reference (c) Section 5.4. |
| Authentication | Required | 5.4.6.2.1 | |
| Integrity | Required | 5.4.6.2.2 | |
| Confidentiality | Required | 5.4.6.2.3 | |
| Non-Repudiation | Required | 5.4.6.2.4 | |
| Availability | Required | 5.4.6.2.5 | |
| NOTE: The annotation of ‘required’ refers to a high-level requirement category. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. | | | |
| LEGEND: | | | |
| ASLAN | Assured Services Local Area Network | IATP | IA Test Plan |
| IA | Information Assurance | UCR | Unified Capabilities Requirements |

7.4 Other. None

8. TEST NETWORK DESCRIPTION. The SUT was tested at JITC in a manner and configuration similar to that of a notional operational environment. The Unified Capabilities Requirements (UCR) operational Defense Information System Network (DISN) Architecture is depicted in Figure 2-2, which depicts the relationship of the ASLAN and non-ASLAN to the DISN switch types. Testing the system's required functions and features was conducted using the test configurations depicted in Figures 2-3 through 2-5. Figure 2-3 depicts the ASLAN components in a homogeneous configuration. Figures 2-4, 2-5, 2-6 and 2-7 depict the ASLAN components in heterogeneous configuration with Brocade and Cisco ASLAN components.

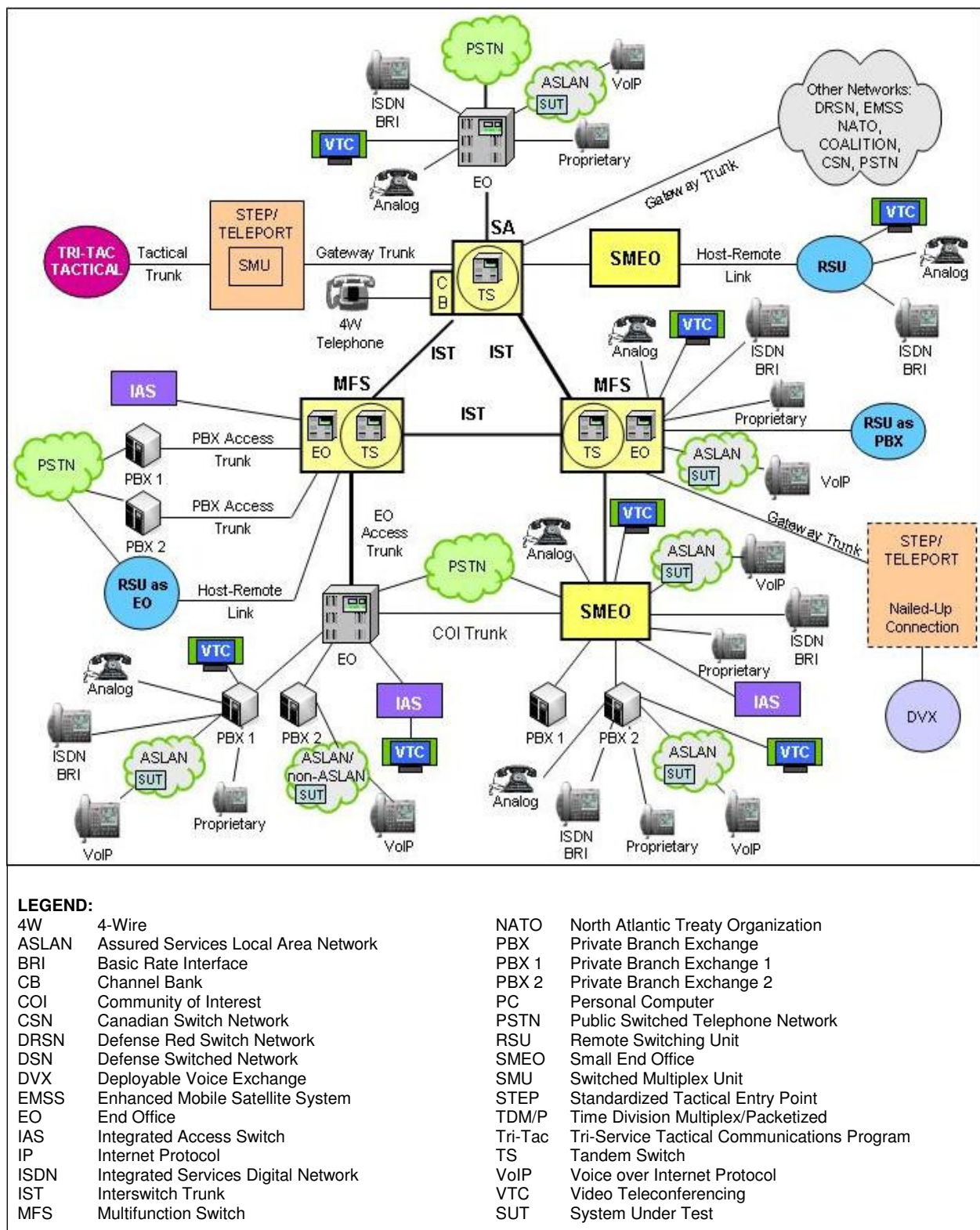


Figure 2-2. DISN Architecture

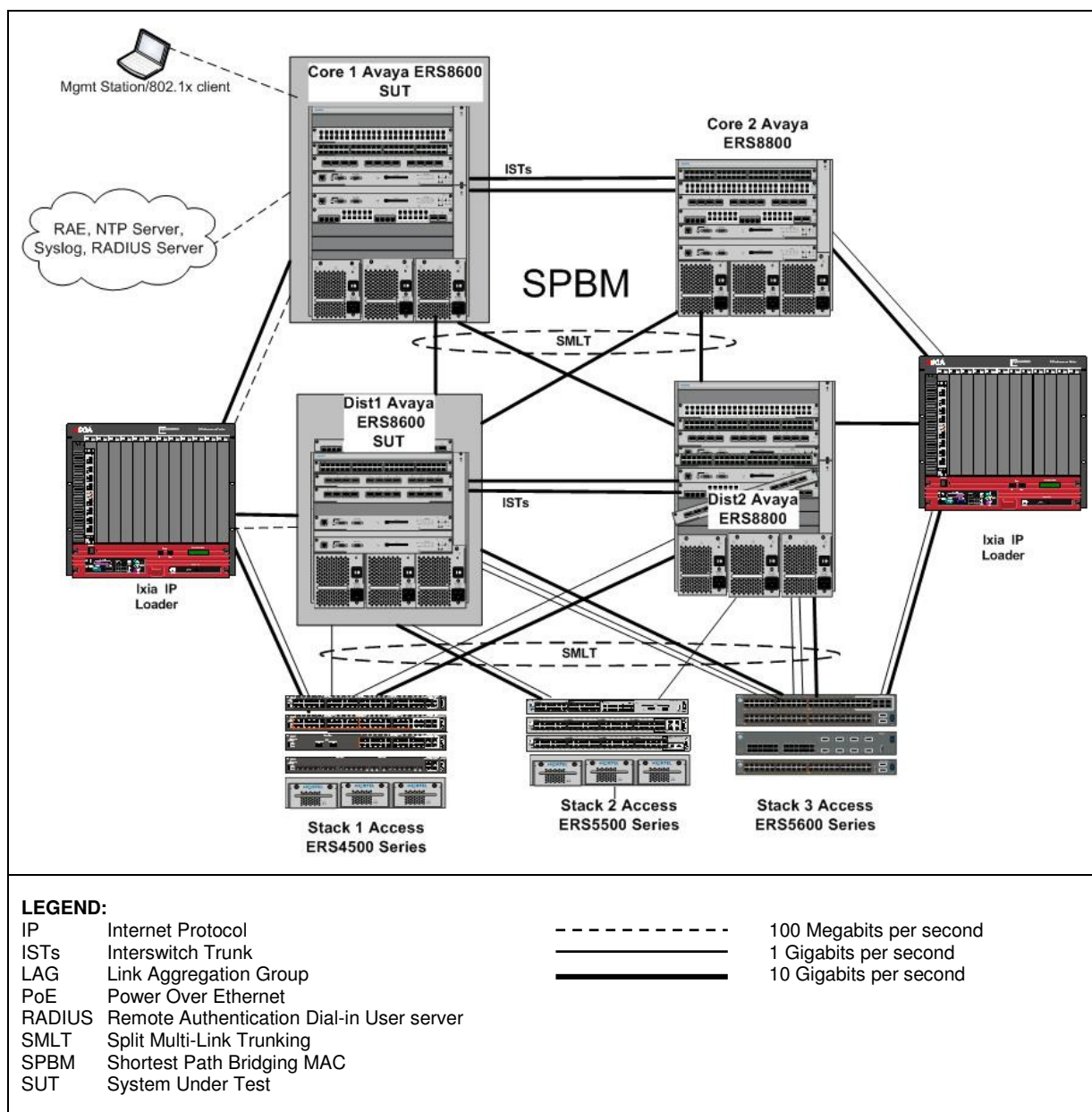


Figure 2-3. SUT Homogeneous Test Configuration

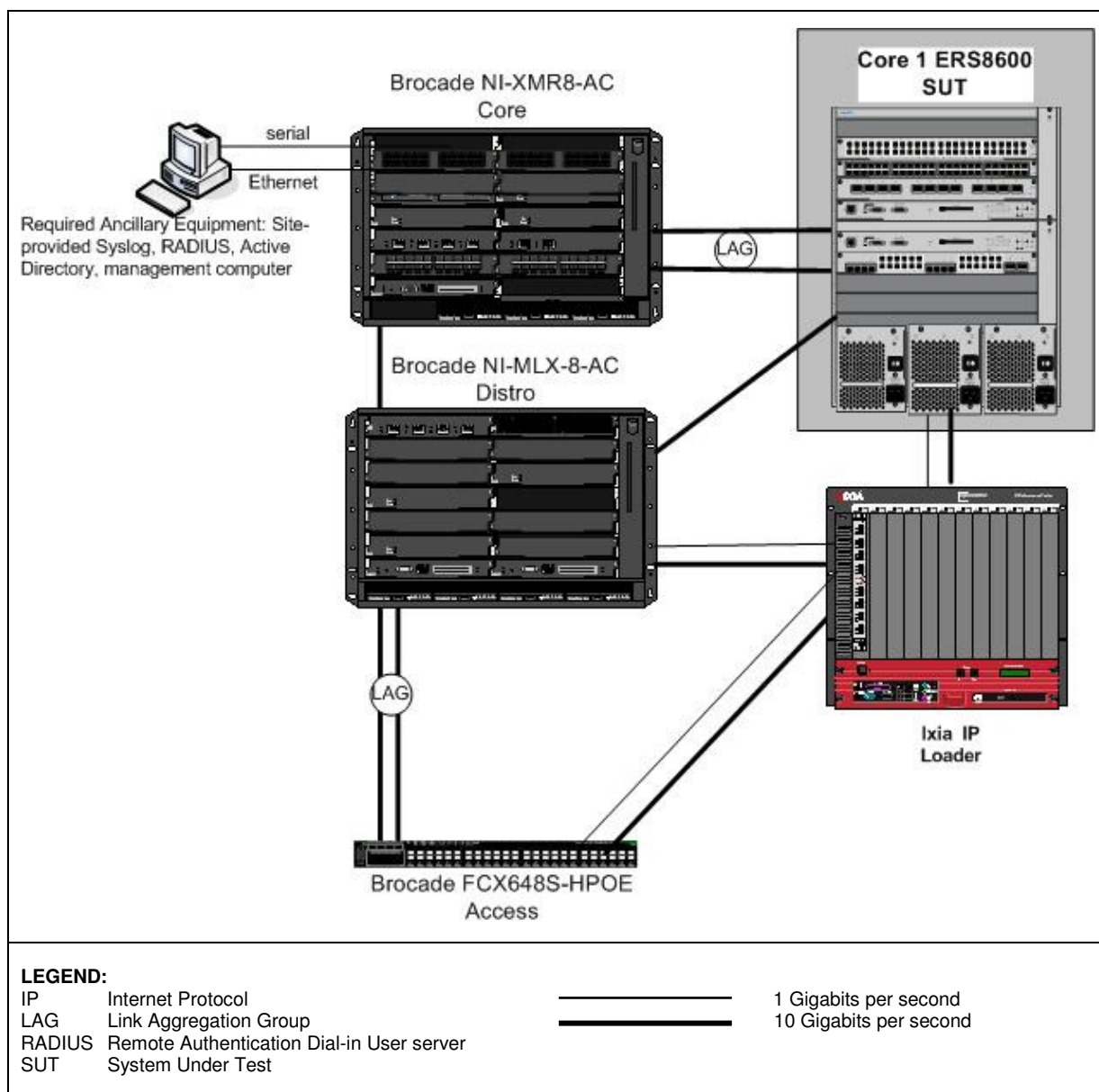


Figure 2-4. SUT as a Core Heterogeneous Test Configuration with Brocade

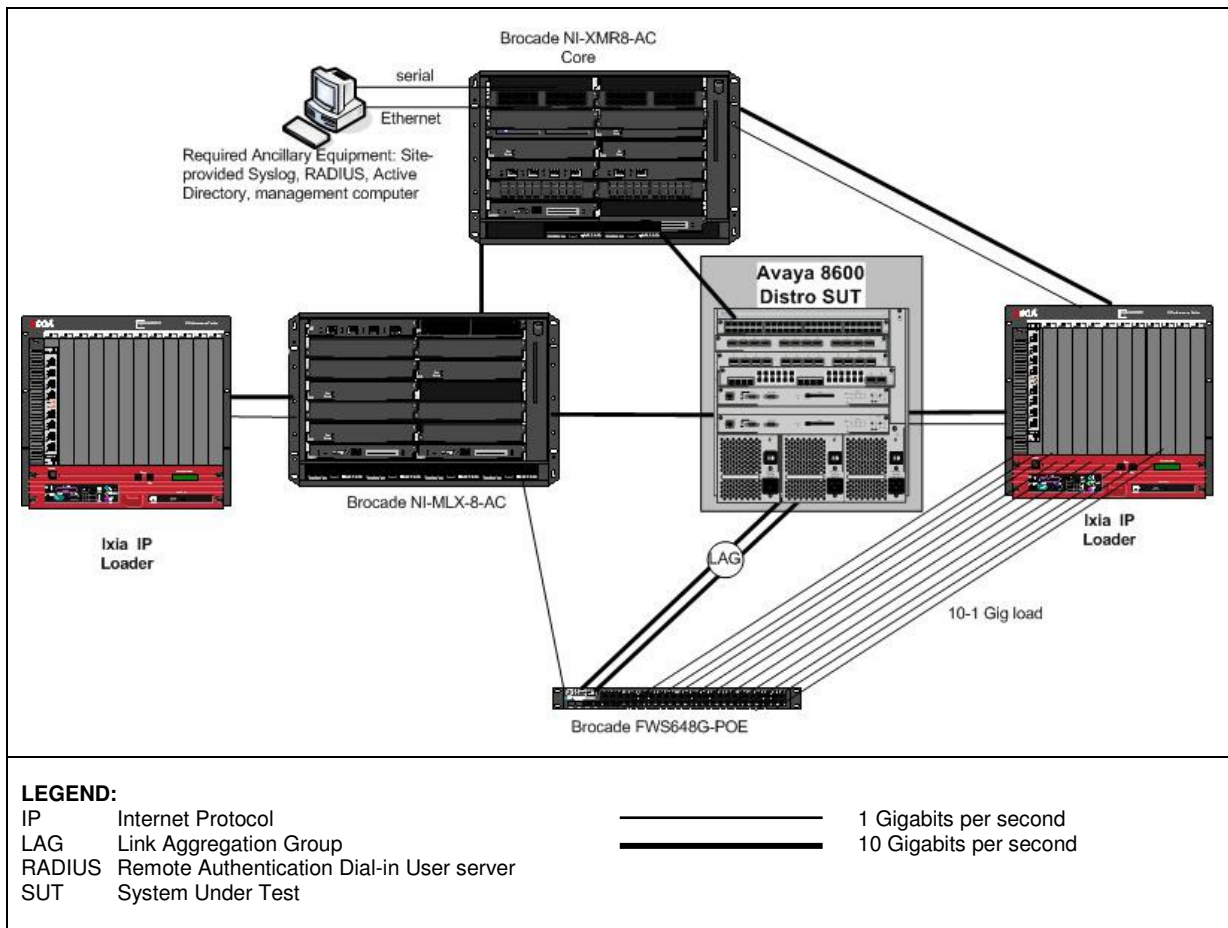


Figure 2-5. SUT as a Distro Heterogeneous Test Configuration with Brocade

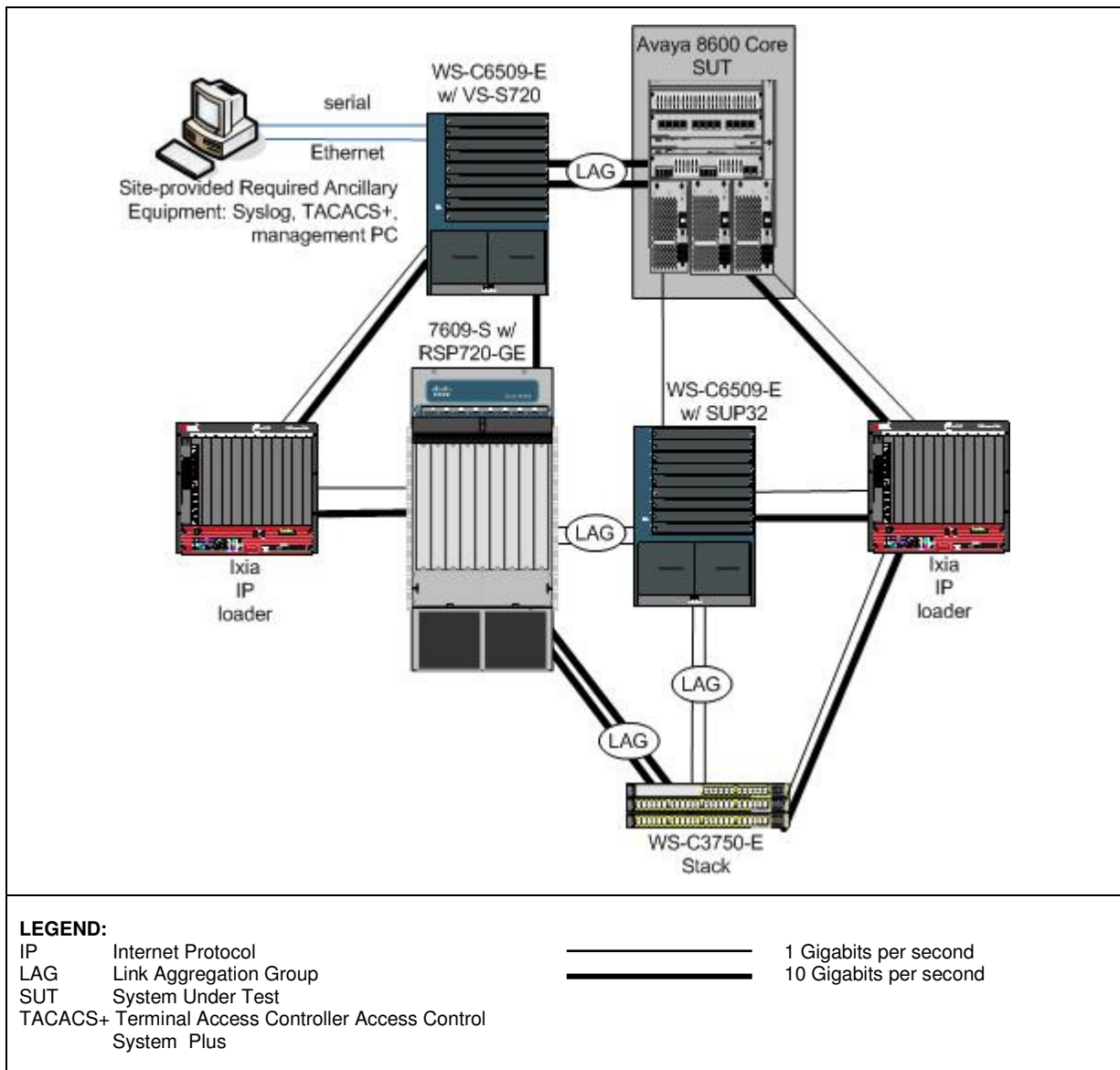


Figure 2-6. SUT as a Core Heterogeneous Test Configuration with Cisco

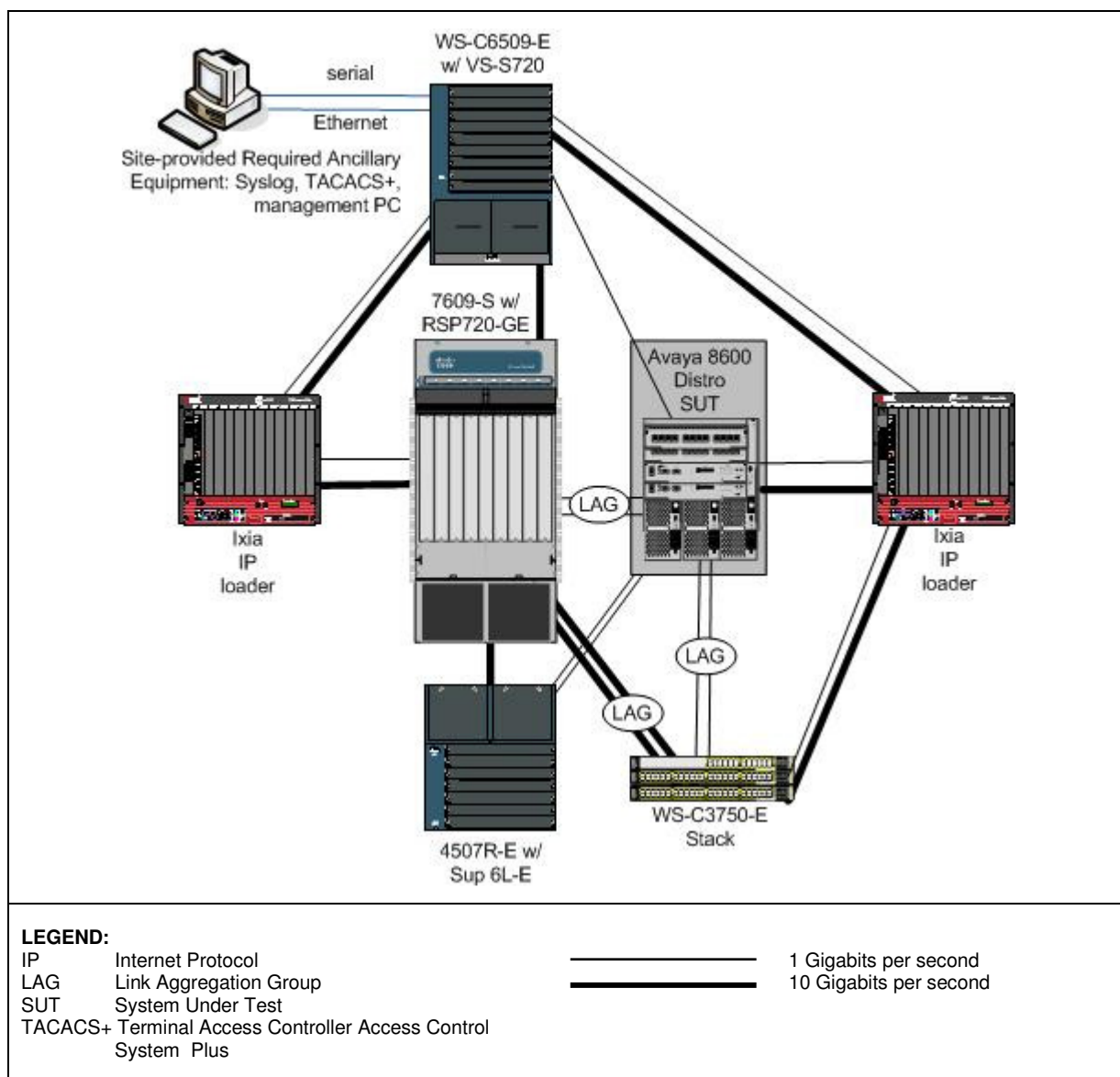


Figure 2-7. SUT as a Distro Heterogeneous Test Configuration with Cisco

9. SYSTEM CONFIGURATIONS. Table 2-4 provides the system configurations and hardware and software components tested with the SUT. The SUT was tested in an operationally realistic environment to determine its interoperability capability with associated network devices and network traffic.

Table 2-4. Tested System Configurations

| System Name | Equipment | | | |
|--|--------------------------------------|----------------------------|-------------------|---|
| Required Ancillary Equipment (site-provided) | Active Directory | | | |
| | Public Key Infrastructure | | | |
| | RADIUS | | | |
| | SysLog Server | | | |
| Additional Equipment Needed | Site-provided Management Workstation | | | |
| Cisco ASLAN | Cisco Hardware | | Cisco Software | |
| | WS-6509-E | | IOS® 12.2(33)SX14 | |
| | 7609-S | | IOS® 12.2(33)SRE2 | |
| | WS-C3750-E | | IOS® 12.2(53)SE2 | |
| | 4507R-E w/SUP 6L-E | | IOS® 12.2(53)SG3 | |
| Brocade ASLAN | Brocade Hardware | | Brocade Software | |
| | NI-XMR-8-AC | | NI 5.1.01 | |
| | NI-MLX-8-AC | | NI 5.1.01 | |
| | FCX648S-HPOE | | FI 7.2.01 | |
| | FWS648G-POE | | FI 7.2.01 | |
| Avaya ASLAN | Avaya Hardware | | Avaya Software | |
| | ERS8800 | | 7.1.0.100_B068 | |
| | ERS4500 Series | | 5.4.100.069 | |
| | ERS5500 Series | | 6.2.100.073 | |
| | ERS5600 Series | | 6.2.100.073 | |
| SUT ¹ | Release | Function | Sub-component | Description |
| ERS8600 | 7.1.0.100_B068 | Core, Distribution, Access | 8692SF | ERS8600 CPU with Switched Fabric board |
| | | | 8648GBRS | 48-port (SFP 1G Ethernet) Routing Switch module/line card |
| | | | 8612XLRS-J | 12-port (10G Ethernet) Routing Switch module/line card with even ports disabled |
| | | | 8612XLRS | 12-port (10G Ethernet) Routing Switch module/line card |
| | | | 8634XGRS | 34-port combo (10/100/1000, 1 G & 10G Ethernet) Routing Switch module/line card |
| | | | 8010 | 10 slot chassis |
| | | | 8006 | 6 slot chassis |
| | | | 8005DC | DC Power supply |
| 8005AC | AC Power supply | | | |
| LEGEND: | | | | |
| AC | Alternating Current | | Gig, GbE | Gigabit Ethernet |
| ASLAN | Assured Services Local Area Network | | PoE | Power over Ethernet |
| CPU | Central Processing Unit | | RADIUS | Remote Authentication Dial-In |
| DC | Direct Current | | | User Server |
| ERS | Ethernet Routing Switch | | SF | Switch Fabric |

10. TESTING LIMITATIONS. None

11. INTEROPERABILITY EVALUATION RESULTS. The SUT meets the critical interoperability requirements for a Core, Distribution, and Layer 2/Layer 3 Access switch in accordance with UCR 2008, Change 2, Section 5.3.1, and is certified for joint use with other network infrastructure products listed on the UC APL. Additional discussion regarding specific testing results is located in subsequent paragraphs.

11.1 Interfaces. The interface status of the SUT is provided in Table 2-5.

Table 2-5. SUT Interface Requirements Status

| Interface | Applicability | | | UCR 2008, Change 2 Reference | Threshold CR/FR ¹ | Status | Remarks |
|-------------|---------------|---|----------------|------------------------------|------------------------------|-------------------------|---|
| | Co | D | A | | | | |
| 10Base-X | C | C | C ² | 5.3.1.3.1 | 1-6 | Met ³ | SUT met CRs and FRs with the following IEEE Standard: 802.3i (10BaseT) |
| 100Base-X | R | R | C ² | 5.3.1.3.1 | 1-6 | Met | SUT met CRs and FRs with the following IEEE Standard: 802.3u (100Base-FX, 100BaseT) |
| 1000Base-X | R | R | C ² | 5.3.1.3.1 | 1-6 | Met | SUT met CR and FRs with the following IEEE Standards: 802.3ab (1000Base-T), 802.3z (1000Base-SX, 1000Base-LX) |
| 10000Base-X | C | C | C | 5.3.1.3.1 | 1-6 | Met | SUT met CRs and FRs with the following IEEE Standard: 802.3ae (10GBASE-SR, 10GBase-LR) |
| 802.11a | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.11b | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.11g | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.11n | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |
| 802.16 | C | C | C | 5.3.1.3.1/5.3.1.7.2 | 1-6 | Not Tested ⁴ | |

NOTES:

1. The SUT high-level CR and FR ID numbers depicted in the Threshold CRs/FRs column can be cross-referenced in Table 2. These high-level CR/FR requirements refer to a detailed list of requirements provided in Enclosure 3.
2. Core and Distribution products must minimally support 100Base-X (802.3u) and 1000Base-X (802.3z). Access products must minimally support one of the following standards: 802.3i (10BaseT), 802.3j (10BaseF), 802.3u (100BaseT/F), 802.3z (1000BaseF), or 802.3ab (1000BaseT). Other rates and standards may be provided as conditional interfaces.
3. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's LoC to comply with IEEE 802.3i standard and the testing data collected at all other data rates.
4. The SUT does not support this interface. This interface is not required for a Core, Distribution, or Access switch.

LEGEND:

A Access
C Conditional
Co Core
CR Capability Requirement
D Distribution
FR Functional Requirement

ID Identification
IEEE Institute of Electrical and Electronics Engineers, Inc.
JITC Joint Interoperability Test Command
LoC Letter of Compliance
SUT System Under Test
UCR Unified Capabilities Requirements

11.2 CR and FR. The SUT CR and FR status is depicted in Table 2-6. Detailed CR/FR requirements are provided in Enclosure 3, Table 3-1.

Table 2-6. SUT CRs and FRs Status

| CR/FR ID | Capability/Function | Applicability ¹ | UCR Reference | Status | Remarks |
|----------|---------------------------------------|----------------------------|---------------|----------------------------|--|
| 1 | General Performance Parameters | | | | |
| | Performance Parameters | Required | 5.3.1.3 | Met | |
| | Port Interface Rates | Required | 5.3.1.3.1 | Met | |
| | Port Parameter Requirements | Required | 5.3.1.3.2 | Met | |
| | Class of Service Markings | Required | 5.3.1.3.3 | Partially Met ² | |
| | VLAN Capabilities | Required | 5.3.1.3.4 | Met | |
| | Protocols | Required | 5.3.1.3.5 | Met | |
| | QoS Features | Required | 5.3.1.3.6 | Met | |
| | Network Monitoring | Required | 5.3.1.3.7 | Met | |
| | Security | Required | 5.3.1.3.8 | Met ³ | |
| 2 | E2E Performance Requirements | | | | |
| | Voice Services | Required | 5.3.1.4.1 | Met ⁴ | |
| | Video services | Required | 5.3.1.4.2 | Met ⁴ | |
| | Data services | Required | 5.3.1.4.3 | Met ⁴ | |
| 3 | NM Requirements | | | | |
| | Configuration Control | Required | 5.3.1.6.1 | Met | |
| | Operational Changes | Required | 5.3.1.6.2 | Met | |
| | Performance Monitoring | Required | 5.3.1.6.3 | Met | |
| | Alarms | Required | 5.3.1.6.4 | Met | |
| | Reporting | Required | 5.3.1.6.5 | Met | |
| 4 | Engineering Requirements | | | | |
| | Physical Media | Required | 5.3.1.7.1 | Met ⁵ | |
| | Traffic Engineering | Required | 5.3.1.7.3 | Met ⁵ | Configured with four queues, each set to 25% of total bandwidth. |
| | Availability | Required | 5.3.1.7.6 | Met | 100% availability during test. |
| | Redundancy | Required | 5.3.1.7.7 | Met | |
| 5 | MPLS | | | | |
| | MPLS Requirements | Conditional | 5.3.1.8.4.1 | Not Tested ⁶ | |
| | MPLS VPN Augmentation to VLANs | Conditional | 5.3.1.8.4.2 | Not Tested ⁶ | |
| 6 | IPv6 Requirements | | | | |
| | Product Requirements | Required | 5.3.5.4 | Partially Met ⁷ | |

Table 2-6. SUT CRs and FRs Status (continued)

NOTES:

1. The annotation of 'required' refers to a high-level requirement category. The applicability of each sub-requirement is provided in Enclosure 3. The system under test does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements.
2. Met all requirements with the following exception: The SUT is unable to reassign any DSCP IPv6 marking. This discrepancy was adjudicated by DISA on 30 November 2011 as having a minor operational impact based on vendor's submission of a POA&M to fix with the next software release in December 2013.
3. Refers to IA requirements for UCR 2008, Change 2, Section 5.4. Detailed IA requirements are included in Reference (e).
4. This requirement was verified and met using simulated voice, video, and data traffic in an operational emulated environment to meet E2E requirements. The SUT must be deployed in accordance with deployment guide and engineering guidelines provided in UCR Change 2, paragraph 5.3.1.4.
5. This requirement was met with the following stipulations: It is the site's responsibility to configure the SUT in a manner which meets the engineering requirements listed in Section 11.2 d. of Enclosure 2 and that does not create a single point of failure which could impact more than 96 C2 users.
6. MPLS was not tested and is not certified for joint use. MPLS is conditional and; therefore, not required for a Core, Distribution, or Access switch.
7. The SUT met the IPv6 requirements with the following exception: The SUT did not meet RFCs 4007 and 4552. This discrepancy was adjudicated by DISA on 30 November 2011 as having a minor operational impact with vendor's POA&M to fix by 1 April 2012.

LEGEND:

| | | | |
|------|---|--------|------------------------------------|
| CR | Capability Requirement | MPLS | Multiprotocol Label Switching |
| DISA | Defense Information Systems Agency | NM | Network Management |
| DISR | Department of Defense Information Technology Standards Registry | OSPFv3 | Open Shortest Path First version 3 |
| DSCP | Differentiated Services Code Point | POA&M | Plan of Action and Milestones |
| E2E | End-to-End | QoS | Quality of Service |
| FR | Functional Requirement | SUT | System Under Test |
| IA | Information Assurance | UCR | Unified Capabilities Requirements |
| ID | Identification | VLAN | Virtual Local Area Network |
| IPv6 | Internet Protocol version 6 | VPN | Virtual Private Network |
| LoC | Letter of Compliance | | |

a. General Performance Parameters: Internet Protocol Version 4 (IPv4) and IPv6.

(1) Performance Parameters IAW UCR 2008 Change 2, Section 5.3.1.3.

The SUT met the performance parameters depicted in the UCR 2008, Change 2 Section 5.3.1.3 with both testing and vendor's LoC. The SUT operated in the required 50 percent non-blocking mode on all interfaces for all Core and Distribution layers and 12.5 percent non-blocking for the Access layer with the following caveats which will be identified by the vendor in their deployment guide for this product:

- The 8612XLRS-J module offers twelve 10G Ethernet ports; however, it is certified in the Core and Distribution layers with only 6 ports (odd ports only) restricted in software and with a vendor fabricated face plate exposing only the odd ports. Furthermore, to meet the one-to-one failover requirement with this module the SUT requires dual processors/switch fabrics per 8600/8800 chassis and two chassis at the Core or Distribution layers.

- The 8634XGRS 10Gig port module had excessive packet loss when used as an InterSwitch Trunk. The 10Gig ports on this module, when configured as an InterSwitch Split-Multi-Link Trunk (SMLT), experienced excessive packet loss. This discrepancy was adjudicated by DISA on 4 October 2011 as having a minor operational impact as long as the module is fielded as Access only and not used for trunking. Therefore, when configured in a homogeneous network the 10Gig ports on this module are certified as access interfaces only.

Jitter was measured to be .005 ms. Latency was measured to be .12 ms average. Packet loss was zero percent which met the requirement for these performance parameters.

(2) Port Interface Rates. The UCR 2008, Change 2, Section 5.3.1.3 states that Core and Distribution products shall minimally support 100 megabits per second (Mbps) in accordance with IEEE 802.3u and 1 gigabit per second (Gbps) IAW with IEEE 802.3z. Access products must minimally provide one of the following interface rates: 10 Mbps IAW IEEE 802.3i & j, 100 Mbps IAW IEEE 802.3u, and 1000 Mbps IAW IEEE 802.3z & 802.3ab. The SUT is certified as interoperable for joint use with other ASLAN components listed on the UC APL with the following interfaces: 1000 Base-SX, 1000Base-LX, 10Gbase-SR, 10Gbase-LR, 10/100/1000BaseT. JITC tested all these interfaces with the exception of the 10BaseT interface. The JITC analysis determined the 10BaseT interface is low risk for certification based on the vendor's LoC to comply with the IEEE 802.3i standard and the testing data collected at all other data rates. All the SUT interfaces linked up at the required rates and negotiated for the correct rates which met this requirement.

(3) Port Parameter Requirements. The UCR 2008, Change 2, Section 5.3.1.3 states that Core, Distribution, and Access products shall provide the following parameters on a per port basis: Auto-negotiation IAW IEEE 802.3, Force mode IAW IEEE 802.3, and Filtering IAW RFC 1812. Port parameters were configurable, and conformed to the requirements. The vendor met these requirements with testing and vendor's LoC.

(4) Class of Service (CoS) Markings. The UCR 2008, Change 2, paragraph 5.3.1.3.3 states that the SUT shall be able to:

- Accept any packet tagged with a Differentiated Services Code Point (DSCP) value (0-63) on an ingress port and assign that packet to a QoS behavior.
- Accept any packet tagged with a DSCP value (0-63) on an ingress port and reassign that packet to any new DSCP value (0-63).
- Support the prioritization of aggregate service classes with queuing according to QoS features.

The SUT met these requirements with one exception: The SUT was able to assign any DSCP value 0-63 to IPv4 traffic per the vendor's LoC. However, IPv6 traffic was unable to re-assign any IPv6 DSCP. This discrepancy was adjudicated by DISA on 23 November 2011 as having a minor operational impact based on vendor's submission of a Plan of Action and Milestones (POA&M) to fix by the next software release in December 2013.

(5) Virtual Local Area Network (VLAN) Capabilities. The SUT met VLAN capabilities IAW UCR 2008, Change 2, paragraph 5.3.1.3.4 with testing and vendor's LoC. The VLAN markings were preserved on the SUT, VLAN tagged traffic was separated and managed according to IEEE 802.1q. The SUT successfully performed both port-based and address-based VLANs and can assign any VLAN tag any value 0 to 4095 which met this requirement.

(6) Protocols. The SUT met all of the protocols IAW UCR 2008, Change 2, paragraph 5.3.1.3.5 for IPv4 and Section 5.3.5 for IPv6 with a vendor's LoC.

(7) QoS Features. The UCR 2008, Change 2, Section 5.3.1.3.6 states that the Core, Distribution, and Access products shall be capable of providing a minimum of four queues, assign any "tagged" session to any of the queues, and support Differentiated Services per hop behaviors and traffic conditioning with an assigned bandwidth percentage per queue, and meet traffic conditioning requirements. The SUT QoS, which includes rate-shaping, performed as configured. All variance was within the limitation of resolution of the test instruments. The test equipment recorded that the higher prioritized traffic was properly queued above lower prioritized best effort traffic; therefore, the SUT met this requirement.

(8) Network Monitoring. Network Monitoring via Simple Network Management Protocol (SNMP) was evaluated by the DISA-led IA team and published in a separate report, Reference (e). Based on this evaluation the SUT met all requirements.

(9) Security. Security testing is accomplished via DISA-led IA test teams and published in a separate report, Reference (e).

b. End-to-End (E2E) Performance Requirements. Voice, Video and Data Services. These requirements were verified and met using simulated voice, video, and data traffic in an operational emulated environment. To meet E2E requirements the SUT must be deployed in accordance with deployment guide and engineering guidelines provided in UCR 2008, Section 5.3.1.4. E2E performance was evaluated in a homogeneous and heterogeneous configuration as depicted in Figures 2-3 through 2-7.

(1) Voice Services.

a. Latency. The UCR 2008, Change 2, paragraph 5.3.1.4.1.1 states that latency shall not be more than 6 ms E2E across the ASLAN as measured under congested conditions. The SUT was tested at 5 ms which met this requirement.

b. Jitter. The UCR 2008, Change 2, paragraph 5.3.1.4.1.2 states that when transporting voice IP packets E2E jitter shall not be more than 3 ms over any 5-minute measured period of congested conditions. The SUT was tested at less than 1 ms which met this requirement.

c. Packet Loss. The UCR 2008, Change 2, paragraph 5.3.1.4.1.3 states that actual measured packet loss across the LAN shall not exceed 0.045 percent within the defined queuing parameters. The packet loss requirement shall be achievable over any 5-minute measured period under congested conditions. The SUT was tested at 0 percent which met this requirement.

(2) Video Services.

a. Latency. The UCR 2008, Change 2, paragraph 5.3.1.4.2.1 states that latency shall not be more than 30 ms E2E across the ASLAN as measured under congested conditions. The SUT was tested at .071 ms which met this requirement.

b. Jitter. The UCR 2008, Change 2, paragraph 5.3.1.4.2.2 states that when transporting voice IP packets E2E jitter shall not be more than 30 ms over any 5-minute measured period of congested conditions. The SUT was tested at less than .001 ms which met this requirement.

c. Packet Loss. The UCR 2008, Change 2, paragraph 5.3.1.4.2.3 states that actual measured packet loss across the LAN shall not exceed 0.015 percent within the defined queuing parameters. The packet loss requirement shall be achievable over any 5-minute measured period under congested conditions. The SUT was tested at 0 percent which met this requirement.

(3) Data Services.

a. Latency. The UCR 2008, Change 2, paragraph 5.3.1.4.2.1 states that latency shall not be more than 45 ms E2E across the ASLAN as measured under congested conditions. The SUT was tested at .091 ms which met this requirement.

b. Jitter. The UCR 2008, Change 2, paragraph 5.3.1.4.2.2 states that there are no jitter requirements for preferred data IP packets.

c. Packet Loss. The UCR 2008, Change 2, paragraph 5.3.1.4.2.3 states that actual measured packet loss across the LAN shall not exceed 0.015 percent within the defined queuing parameters. The packet loss requirement shall be achievable over any 5-minute measured period under congested conditions. The SUT was tested at 0 percent which met this requirement.

c. Network Management (NM) Requirements. The following NM requirements were met by vendor's LoC and evaluated by IA under a separate report, Reference (e):

(1) Configuration Control. IAW UCR 2008 Change 2, paragraph 5.3.1.6.1, the SUT Network Management System (NMS) shall report configuration change events in near-real-time (NRT). The system shall report the success or failure of authorized configuration change attempts in NRT. NRT is defined as within 5 seconds of detecting the event, excluding transport time.

(2) Operational Changes. IAW UCR 2008 Change 2 paragraph 5.3.1.6.2, local area network (LAN) infrastructure components must provide metrics to the NMS to allow them to make decisions on managing the network. The SUT NMS shall have an automated NM capability to obtain the status of networks and associated assets in NRT 99 percent of the time (with 99.9 percent as an Objective Requirement).

(3) Performance Monitoring. IAW UCR 2008 Change 2, paragraph 5.3.1.6.3, all LAN components shall be capable of providing status changes 99 percent of the time (with 99.9 percent as an Objective Requirement) by means of an automated capability in NRT. The SUT NMS will have an automated NM capability to obtain the status of networks and associated assets 99 percent of the time (with 99.9 percent as an Objective Requirement) within 5 seconds of detecting the event, excluding transport. The NMS shall collect statistics and monitor bandwidth utilization, delay, jitter, and packet loss.

(4) Alarms. IAW UCR 2008 Change 2, paragraph 5.3.1.6.4, all LAN components shall be capable of providing SNMP alarm indications to an NMS. The SUT NMS will have the NM capability to perform automated fault management of the network, to include problem detection, fault correction, fault isolation and diagnosis, problem tracking until corrective actions are completed, and historical archiving.

(5) Reporting. IAW UCR 2008 Change 2, paragraph 5.3.1.6.5, to accomplish Global Information Grid E2E situational awareness, an NMS will have the NM capability of automatically generating and providing an integrated/correlated presentation of network and all associated networks.

d. Engineering Requirements.

(1) Physical Media. Per UCR 2008 Change 2 paragraph 5.3.1.7.1, Copper Media, wires used for the LAN shall not be lower than a Category 5 performance.

(2) Traffic Engineering. According to UCR 2008 Change 2 paragraph 5.3.1.7.3, bandwidth in the LAN shall be engineered so that Voice IP subscribers do not exceed more than 25 percent of available trunk bandwidth and no single point of failure within the ASLAN can cause a voice service outage to more than 96 users.

(3) Availability. According to UCR 2008 Change 2 paragraph 5.3.1.7.6, System reliability must be engineered for 99.999 percent for FLASH/FLASH OVERRIDE users, 99.997 for IMMEDIATE/PRIORITY users in an ASLAN. ROUTINE users may be supported by a non-ASLAN with a reliability of only 99.9 percent. C2 users may not be supported by a non-ASLAN. It is the site responsibility to configure the SUT in a manner which meets the user requirement and that does not create a single point of failure which could impact more than 96 C2 users.

(4) Redundancy. UCR 2008 Change 2 paragraph 5.3.1.7.7 states no single point of failure affecting more than 96 users, may take longer than five seconds for the network to resume IP traffic. The SUT must meet the redundancy failover requirement with either a single chassis or multiple chassis not to exceed 5 seconds. The SUT meets this requirement with the following exception: To meet the one-to-one failover requirement with this module, the SUT requires dual processors/switch fabrics per 8600/8800 chassis and two chassis at the Core or Distribution layer. The 8612XLRS-J is a 12-10G Ethernet ports module however, it is certified as Core and Distribution layer switches with only 6 ports (odd ports only) restricted in software and with a vendor fabricated face plate exposing only the odd ports. The SUT had redundant power supply resources. The SUT performed power supply failover with no loss. Dual chassis failover in both homogeneous and heterogeneous configuration was performed by the SUT in less than one second for IPv4 and IPv6 traffic. SMLT and/or Shortest Path Bridging MAC (SPBm) was utilized in the homogeneous configuration in place of Link Aggregate Control Protocol (LACP). SMLT failover of a primary link in homogeneous configuration occurred in 51 ms. In the heterogeneous configuration, LACP was used and failover occurred in 700 ms when configured in a heterogeneous configuration with Brocade and 191 ms when configured in a heterogeneous configuration with Cisco. Homogeneous Non-LACP primary link failover occurred in 0.13 milliseconds for IPv4 and 0.12 milliseconds for IPv6. Non-LACP primary link failover occurred in 974 milliseconds for IPv4 and IPv6 traffic when configured in a heterogeneous network with Cisco. Non-LACP primary link failover occurred in a heterogeneous network with Brocade in 3 seconds for IPv4 and 4.4 seconds for IPv6. SPBm link failover was measured at 90 ms and switch fabric failover was measured at 2.75 ms.

e. Multiprotocol Label Switching (MPLS) Requirements. MPLS was not evaluated. This is a conditional requirement for a Core, Distribution, or Access switch.

f. IPv6 Requirements. IPv6 requirements were met by testing with the following exception: The SUT did not meet RFCs 4007 and 4552. This discrepancy was adjudicated by DISA on 30 November 2011 as having a minor operational impact with a vendor POA&M to fix by 1 April 2012. The SUT was tested and certified for joint use with IPv6 voice, video, and data traffic.

11.3 Information Assurance (IA). Security testing is accomplished via DISA-led IA test teams and published in a separate report, Reference (e).

11.4 Other. None

12. TEST AND ANALYSIS REPORT. No detailed test report was developed in accordance with the Program Manager's request. JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Unclassified-But-Sensitive Internet Protocol Router Network (NIPRNet) e-mail. More comprehensive interoperability status information is available via the JITC System 2-7 Tracking Program (STP). The STP is accessible by .mil/gov users on the NIPRNet at <https://stp.fhu.disa.mil>. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at <http://jit.fhu.disa.mil> (NIPRNet). Information related to DSN testing is on the Telecom Switched Services Interoperability (TSSI) website at <http://jitc.fhu.disa.mil/tssi>.

SYSTEM FUNCTIONAL AND CAPABILITY REQUIREMENTS

The Assured Services Local Area Networks (ASLAN) components have required and conditional features and capabilities that are established by Section 5.3.1 of the Unified Capabilities Requirements (UCR). The system under test does not need to provide conditional requirements. However, if a capability is provided, it must function according to the specified requirements. The detailed Functional requirements (FR) and Capability Requirements (CR) for ASLAN products are listed in Table 3-1. Detailed Information Assurance (IA) requirements are included in Reference (e).

Table 3-1. ASLAN Products CRs and FRs

| ID | Requirement (See note.) | | UCR Reference |
|----|--|--|------------------------|
| 1 | ASLAN components can have no single point of failure for >96 users for C2 and Special C2 users. Non-ASLAN components can have a single point of failure for C2(R) and non-C2 users. (R) | | 5.3.1.2.1, 5.3.1.7.7 |
| 2 | Non-blocking of any voice or video traffic at 50% for Core and distribution layer switches and 12.5% blocking for access layer switches. (R) | | 5.3.1.3 |
| 3 | Maximum of 1 ms of jitter for voice and 10 ms for video for all ASLAN components. (R) Does not apply to preferred data and best effort data. | | 5.3.1.3 |
| 4 | Maximum of .015% packet loss for voice and .05 % for video and preferred data for all ASLAN components. (R) Does not apply to best effort data. | | 5.3.1.3 |
| 5 | Maximum of 2 ms latency for voice, 10 ms for video, and 15 ms for preferred data for all ASLAN components. (R) Does not apply to best effort data. | | 5.3.1.3 |
| 6 | 100 Mbps IAW IEEE 802.3u and 1 Gbps IAW IEEE 802.3z for Core and distribution layer components and at least one of the following IEEE interfaces for access layer components: 802.3i, 802.3j, 802.3u, 802.3ab, and 802.3z. (R) | | 5.3.1.3.1 |
| 7 | Force mode and auto-negotiation IAW IEEE 802.3, filtering IAW RFC 1812, and flow control IAW IEEE 802.3x. (R) | | 5.3.1.3.2 |
| 8 | Port Parameter Requirements | Auto-negotiation IAW IEEE 802.3. (R) | 5.3.1.3.2 |
| 9 | | Force mode IAW IEEE 802.3. (R) | |
| 10 | | Flow control IAW IEEE 802.3x. (R) Conditional for Core | |
| 11 | | Filtering IAW RFC 1812. (R) | |
| 12 | | Link Aggregation IAW IEEE 802.3ad (output/egress ports only). (R) | |
| 13 | | Spanning Tree Protocol IAW IEEE 802.1D. (R) Conditional for Core | |
| 14 | | Multiple Spanning Tree IAW IEEE 802.1s. (R) Conditional for Core | |
| 15 | | Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w. (R) Conditional for Core | |
| 16 | LACP link Failover and Link Aggregation IAW IEEE 802.3ad (uplink ports only) Core and distribution switches (C) | | 5.3.1.3.2, 5.3.1.7.7.1 |
| 17 | Class of Service Marking: Layer 3 DSCPs IAW RFC 2474. (R) Layer 2 3-bit user priority field of the IEEE 802.1Q 2-byte TCI field. (C) | | 5.3.1.3.3 |
| 18 | VLAN Capabilities IAW IEEE 802.1Q. (R) | | 5.3.1.3.4 |
| 19 | Protocols IAW DISR profile (IPv4 and IPv6). IPv4 (R: LAN Switch, Layer 2 Switch): IPv6 (R: LAN Switch, C: Layer 2 Switch). Note: Layer 2 switch is required to support only RFC 2460, 5095, 2464, and be able to queue packets based on DSCPs in accordance with RFC 2474. | | 5.3.1.3.5 |
| 20 | QoS Features | Shall support minimum of 4 queues. (R) | 5.3.1.3.6 |
| 21 | | Must be able to assign VLAN tagged packets to a queue. (R) | |
| 22 | | Support DSCP PHBs per RFCs 2474, 2597, 2598, and 3246. (R: LAN Switch). Note: Layer 2 switch is required to support RFC 2474 only. | |
| 23 | | Support a minimum of one of the following: WFQ IAW RFC 3662, PQ IAW RFC 1046, or Class-Based WFQ IAW RFC 3366. (R) | |
| 24 | Network Monitoring | Must be able to assign a bandwidth or percent of traffic to any queue. (R) | 5.3.1.3.7 |
| 25 | | SNMP IAW RFC's 1157, 2206, 3410, 3411, 3412, 3413, and 3414. (R) | |
| 26 | | SNMP traps IAW RFC1215. (R) | |
| 27 | | Remote monitoring IAW RFC1281 and AES Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. (R) | |
| 28 | Product Requirements Summary IAW UCR 2008, Change 2, Table 5.3.1-5. (R) | | 5.3.1.3.9 |
| 29 | E2E Performance (Voice) | No more than 6 ms latency over any 5-minute period measured under 100% congestion. (R) | 5.3.1.4.1 |
| | | No more than 3 ms jitter over any 5-minute period measured under 100% congestion. (R) | |
| | | Packet loss not to exceed .045% engineered (queuing) parameters over any 5-minute period under 100% congestion. (R) | |

Table 3-1. SUT CRs and FRs (continued)

| ID | Requirement (See note.) | | UCR Reference |
|----|--|--|------------------|
| 30 | E2E Performance (Video) | No more than 30 ms latency over any 5-minute period measured under 100% congestion. (R) | 5.3.1.4.2 |
| | | No more than 30 ms jitter over any 5-minute period measured under 100% congestion. (R) | |
| | | Packet loss not to exceed .15% engineered (queuing) parameters over any 5-minute period under 100% congestion. (R) | |
| 31 | E2E Performance (Data) | No more than 45 ms latency over any 5-minute period measured under 100% congestion. (R) | 5.3.1.4.3 |
| | | Packet loss not to exceed .15% engineered (queuing) parameters over any 5-minute period under 100% congestion. (R) | |
| 32 | LAN Network Management | Configuration Control for ASLAN and non-ASLAN. (R) | 5.3.1.6.1 |
| 33 | | Operational Controls for ASLAN and non-ASLAN. (R) | 5.3.1.6.2 |
| 34 | | Performance Monitoring for ASLAN and non-ASLAN. (R) | 5.3.1.6.3 |
| 35 | | Alarms for ASLAN and non-ASLAN. (R) | 5.3.1.6.4 |
| 36 | | Reporting for ASLAN and non-ASLAN. (R) | 5.3.1.6.5 |
| 37 | Redundancy | Redundant Power Supplies. (Required on standalone redundant products.) | 5.3.1.7.7 |
| 38 | | Chassis Failover. (Required on standalone redundant products.) | |
| 39 | | Switch Fabric Failover. (Required on standalone redundant products.) | |
| 40 | | Non-LACP Link Failover. (R) | |
| 41 | | Fiber Blade Failover. (R) | |
| 42 | MPLS | Stack Failover. (C) (Required if the stack supports more than 96 users.) | 5.3.1.8.4.1 |
| 43 | | CPU (routing engine) blade Failover. (R) | |
| 44 | | MPLS May not add measurable Loss or Jitter to system. (C) | |
| 45 | | MPLS Conforms to RFCs in Table 5.3.1-14. (C) | |
| 46 | | MPLS Support L2 and L3 VPNs. (C) | 5.3.1.8.4.2.1 /2 |
| 47 | IPv6 Product Requirements: Dual Stack for IPv4 and IPv6 IAW RFC 4213 if routing functions are supported. (C) | | 5.3.5.4 |
| 48 | IPv6 System Requirements | Support IPv6 IAW RFCs 2460 and 5095 if routing functions are supported. (C) | 5.3.5.4 |
| 49 | | Support IPv6 packets over Ethernet IAW RFC2464. (R) | 5.3.5.4 |
| 50 | | Support MTU discovery IAW RFC 1981 if routing functions are supported. (R) | 5.3.5.4.1 |
| 51 | | Support a minimum MTU of 1280 IAW RFCs 2460 and 5095. (C) | 5.3.5.4.1 |
| 52 | | Shall support IPv6 addresses IAW RFC 4291. (R) | 5.3.5.4.3 |
| 53 | | Shall support IPv6 scoped addresses IAW RFC4007. (R) | 5.3.5.4.3 |
| 54 | | if routing functions are supported: If DHCP is supported must be IAW RFC3315, if DHCPv6 is supported it shall be IAW RFC 3313. (C) | 5.3.5.4.4 |
| 55 | IPv6 Router Advertisements | If the system supports routing functions, the system shall inspect valid router advertisements sent by other routers and verify that the routers are advertising consistent information on a link and shall log any inconsistent router advertisements, and shall prefer routers that are reachable over routers whose reachability is suspect or unknown. (C) | 5.3.5.4.5.2 |
| 56 | | If the system supports routing functions, the system shall include the MTU value in the router advertisement message for all links in accordance with RFCs 2461 and 4861. (C) | |
| 57 | | IPv6 Neighbor Discovery: The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R) | |
| 58 | IPv6 Neighbor Discovery | if routing functions are supported: Neighbor discovery IAW RFCs 2461 and 4861. (C) | 5.3.5.4.5 |
| 59 | | The system shall not set the override flag bit in the neighbor advertisement message for solicited advertisements for anycast addresses or solicited proxy advertisements. (R) | |
| 60 | | The system shall set the override flag bit in the neighbor advertisement message to "1" if the message is not an anycast address or a unicast address for which the system is providing proxy service. (R) | |
| 61 | IPv6 SLAAC and Manual Address Assignment | If the system supports stateless IP address Auto-configuration, the system shall support IPv6 SLAAC for interfaces supporting UC functions in accordance with RFCs 2462 and 4862. (C) | 5.3.5.4.6 |
| 62 | | If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the function to be enabled and disabled. (C) | |
| 63 | | If the product supports IPv6 SLAAC, the product shall have a configurable parameter that allows the "managed address configuration" flag and the "other stateful configuration" flag to always be set and not perform stateless auto-configuration. (C) | |

Table 3-1. SUT CRs and FRs (continued)

| ID | Requirement (See note.) | | UCR Reference |
|----|--------------------------|--|---------------|
| 64 | | If the product supports stateless IP address auto-configuration including those provided for the commercial market, the DAD shall be disabled in accordance with RFCs 2462 and 4862. (R) | |
| 65 | | The system shall support manual assignment of IPv6 addresses. (R) | |
| 66 | | If the system provides routing functions, the system shall default to using the "managed address configuration" flag and the "other stateful flag" set to TRUE in their router advertisements when stateful auto-configuration is implemented. (C) | |
| 67 | IPv6 ICMP | The system shall support the ICMPv6 as described in RFC 4443. (R) | 5.3.5.4.7 |
| 68 | | The system shall have a configurable rate limiting parameter for rate limiting the forwarding of ICMP messages. (R) | |
| 69 | | The system shall support the capability to enable or disable the ability of the system to generate a Destination Unreachable message in response to a packet that cannot be delivered to its destination for reasons other than congestion. (R) Required if LS supports routing functions. | |
| 70 | | The system shall support the enabling or disabling of the ability to send an Echo Reply message in response to an Echo Request message sent to an IPv6 multicast or anycast address. (R) | |
| 71 | | The system shall validate ICMPv6 messages, using the information contained in the payload, prior to acting on them. (R) | |
| 72 | IPv6 Routing Functions | If the system supports routing functions, the system shall support the OSPF for IPv6 as described in RFC 5340. (C) | 5.3.5.4.8 |
| 73 | | If the system supports routing functions, the system shall support securing OSPF with Internet Protocol Security (IPSec) as described for other IPSec instances in UCR 2008, Section 5.4. (C) | |
| 74 | | If the system supports routing functions, the system shall support OSPF for IPv6 as described in RFC 2740, router to router integrity using IP authentication header with HMAC-SHA1-96 with ESP and AH as described in RFC 2404, shall support OSPFv3 IAW RFC 4552. (C) | |
| 75 | | If the system supports routing functions, the system shall support the MLD process as described in RFC 2710 and extended in RFC 3810. (C) | |
| 76 | Site Requirements | Engineering Requirements: Physical Media for ASLAN and non-ASLAN. (R) (Site requirement) | 5.3.1.7.1 |
| 77 | | Battery Back up two hours for non-ASLAN components and eight hours for ASLAN components. (R) (Site requirement) | 5.3.1.7.5 |
| 78 | | Availability of 99.999 percent (Special C2), and 99.997 percent (C2) for ASLAN (R), and 99.9 percent (non-C2 and C2(R) for non-ASLAN. (R) (Site requirement) | 5.3.1.7.6 |
| 79 | IA Security requirements | Port-Based access Control IAW IEEE 802.1x. (R) Conditional for Core | 5.3.1.3.2 |
| 80 | | Secure methods for network configuration. SSH2 instead of Telnet and support RFCs 4251-4254. Must use HTTPS instead of http, and support RFCs 2660 and 2818 for ASLAN and non-ASLAN. (R) | 5.3.1.6 |
| 81 | | Security (R) | 5.3.1.3.8 |
| 82 | | Must meet IA requirements IAW UCR 2008, Change 2, Section 5.4 for ASLAN and non-ASLAN. (R) | 5.3.1.5 |

NOTE: All requirements are for Core, distribution, and access layer components unless otherwise specified.

Table 3-1. SUT Capability and Functional Requirements (continued)

| | | | | | |
|----------------|---|--------|---|--------|--------------------------------------|
| LEGEND: | | | | | |
| AES | Advanced Encryption Standard | HTTP | Hypertext Transfer Protocol | MTU | Maximum Transmission Unit |
| AH | Authentication Header | HTTPS | Hyper Text Transfer Protocol, Secure | OSPF | Open Shortest Path First |
| ASLAN | Assured Services Local Area Network | IA | Information Assurance | OSPFv3 | Open Shortest Path First Version 3 |
| C | Conditional | IAW | in accordance with | PHB | Per Hop Behavior |
| C2 | Command and Control | ICMP | Internet Control Message Protocol | PQ | Priority Queuing |
| C2(R) | Command and Control ROUTINE only | ICMPv6 | Internet Control Message Protocol for IPv6 | QoS | Quality of Service |
| CPU | Central Processing Unit | ID | Identification | R | Required |
| DAD | Duplicate Address Detection | IEEE | Institute of Electrical and Electronics Engineers | RFC | Request for Comments |
| DHCP | Dynamic Host Configuration Protocol | IPv4 | Internet Protocol version 4 | SHA | Secure Hash Algorithm |
| DHCPv6 | Dynamic Host Configuration Protocol for IPv6 | IPv6 | Internet Protocol version 6 | SLAAC | Stateless Auto Address Configuration |
| DISR | Department of Defense Information Technology Standards Registry | L2 | Layer 2 | SNMP | Simple Network Management Protocol |
| DSCP | Differentiated Services Code Point | L3 | Layer 3 | SSH2 | Secure Shell Version 2 |
| E2E | End-to-End | LACP | Link Aggregation Control Protocol | SUT | System Under Test |
| ESP | Encapsulating Security Payload | LAN | Local Area Network | TCI | Tag Control Information |
| Gbps | Gigabits per second | LS | LAN Switch | UC | Unified Capabilities |
| HMAC | Hash-based Message Authentication Code | Mbps | Megabits per second | UCR | Unified Capabilities Requirements |
| | | MLD | Multicast Listener Discovery | VLAN | Virtual Local Area Network |
| | | MPLS | Multiprotocol Label Switching | VPN | Virtual Private Network |
| | | ms | millisecond | WFQ | Weighted Fair Queuing |